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Voluntary Product Standard

PS 63-75

U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

LATEX FOAM MATTRESSES FOR HOSPITALS



**American National
Standards Institute**

American National Standard Z 255.1-1975

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¹ Headquarters and Laboratories at Gaithersburg, Maryland, unless otherwise noted; mailing address Washington, D.C. 20234.

² Part of the Center for Radiation Research.

³ Located at Boulder, Colorado 80302.

⁴ Part of the Center for Building Technology.

Voluntary Product Standard PS 63-75,

Latex Foam Mattresses for Hospitals


Approved by the American National Standards Institute on
February 3, 1975, as American National Standard Z255.1-1975

Abstract

The purpose of this Voluntary Product Standard is to establish nationally recognized dimensional and quality requirements for latex foam mattresses intended for use in hospitals, and to provide producers, distributors, and users with a basis for common understanding of the characteristics of this product.

Key words: Foam mattresses; hospital mattresses; latex; latex foam mattresses; latex foam for hospitals; mattresses.

Nat. Bur. Stand. (S.U.), Prod. Stand. 63-75, 8 pages (April 1975)
CODEN: XNPSAX



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Contents

1. Purpose	1
2. Scope	1
3. Requirements	1
3.1. General	1
3.2. Flammability	1
3.3. Mattress cover	1
3.3.1. Material	1
3.3.2. Construction	2
3.3.3. Dimensions	2
3.3.4. Stitching	3
3.3.4.1. Thread	3
3.3.4.2. Seams and stitching	3
3.3.4.3. Sewing (anchoring) tape	3
3.4. Mattress insert	4
3.4.1. Material	4
3.4.2. Dimensions	4
3.4.3. Construction	4
3.4.3.1. Surface defects	4
3.4.3.2. Insert reinforcements	4
4. Inspection and Test Procedures	4
4.1. Resistance of the cover to mineral oil	4
4.2. Exceptions to Method 6711 when testing for resistance of the cover to alcohol	4
4.3. Exceptions to Method 6711 when testing for resistance of the cover to phenol	4
4.4. Exceptions to Method 7411 when testing for resistance of the cover to steriliza- tion	4
4.5. Exceptions to ASTM D 1203-67 (Method A), when testing plasticizer loss of the cover	4
5. Identification	
6. Effective Date	5
7. History of Project	5
8. Standing Committee	5
Appendix A—Care of Latex Foam Mattresses	5
Appendix B—Metric Conversion	6

VOLUNTARY PRODUCT STANDARDS

Voluntary Product Standards are developed under procedures published by the Department of Commerce in Part 10, Title 15, of the Code of Federal Regulations. The purpose of the standards is to establish nationally recognized requirements for products, and to provide all concerned interests with a basis for common understanding of the characteristics of the products. The National Bureau of Standards administers the *Voluntary Product Standards* program as a supplement to the activities of the private sector standardizing organizations. -

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The benefits derived from *Voluntary Product Standards* are in direct proportion to their general recognition and actual use. Producers and distributors whose products meet the requirements of a *Voluntary Product Standard* may refer to the standard in advertising and on labels to promote greater public understanding of or confidence in their products. Purchasers may order products conforming to the requirements of the standards.

For copies of the *Voluntary Product Standards* procedures or for more information concerning the development and use of these standards you may write to: Standards Development Services Section, National Bureau of Standards, Washington, D.C. 20234.

Latex Foam Mattresses for Hospitals

Effective February 3, 1975 (See section 6.)

(This Standard, initiated by the Rubber Manufacturers Association, has been developed under the *Procedures for the Development of Voluntary Product Standards*, published by the U.S. Department of Commerce, as a revision of Commercial Standard CS 182-51, *Latex Foam Mattresses for Hospitals*.)

1. PURPOSE

The purpose of this Voluntary Product Standard is to establish nationally recognized dimensional and quality requirements for latex foam mattresses intended for use in hospitals, and to provide producers, distributors, and users with a basis for common understanding of the characteristics of this product.

2. SCOPE

This Voluntary Product Standard covers requirements and methods of test for the materials, dimensions, and construction of latex foam mattresses intended for use in hospitals. Methods for identifying products that conform to this Standard are provided. Information regarding the care of latex foam mattresses is given in Appendix A.

Note: As an aid in correlating U.S. customary units to metric units conversion factors for units used in this Standard are given in Appendix B.

3. REQUIREMENTS

3.1. General—All latex foam mattresses represented as complying with this Voluntary Product Standard shall meet all of the requirements specified herein. Later issues of publications referenced in this Standard may be used providing the requirements are applicable and consistent with the issue designated. Copies of standard FF4-72, *Standard for the Flammability of Mat-*

tresses,¹ or its successor, are available from the Consumer Product Safety Commission, Washington, DC 20207. Copies of Federal (FED) Standards and Specifications are obtained from Specification Sales (3FRDS), Building 197, Washington Navy Yard, General Services Administration, Washington, D.C. 20407. American Society for Testing and Materials (ASTM) publications are available from ASTM offices, 1916 Race Street, Philadelphia, Pa. 19103.

3.2. Flammability—Mattresses shall comply with the flammability requirements of FF4-72, which has been issued as a mandatory standard under authority of the Flammable Fabrics Act as amended in 1967.

3.3. Mattress cover

3.3.1. Material—The mattress cover shall be made of cloth coated with plastic at least on the exposed surface and shall have the properties shown in table 1 when tested as specified therein.

¹ All mattresses, including hospital mattresses, must meet FF4-72, amended June 8, 1973. It is recognized that additional flammability requirements such as those given in MIL-M-18351E, *Mattresses, Berth, Synthetic Sponge Rubber, Naval Shipboard* (available from Naval Publications and Forms Center, 580 Tabor Avenue, Philadelphia, Pa. 19120), may be desired and specified under certain conditions by some purchasers.

TABLE 1. *Properties and test methods for the mattress cover*

Property	Requirement	Test Method	Exceptions to referenced test methods
Breaking strength	115 lb in warp direction (min) 90 lb in fill direction (min)	ASTM D 751-73, <i>Standard Methods of Testing Coated Fabrics</i> , Sections 8 through 12	Speed of pulling clamp shall be $12 + \frac{1}{2}$ inch/min
Resistance to blocking	Blocking not more than slight	FED 191, Method 5872	
Adhesion of coating	4 lb per inch of width (min)	ASTM D 751-73, Sections 39-42	
Thickness of coating	0.004 inch on the exposed surface (min)	FED 601, Method 2011	The thickness determinations shall be made by comparing the cover thickness of identical spots before and after stripping the coating.
Hydrostatic resistance	No evidence of leaks at 15 lb/in ²	ASTM D 751-73, Sections 30-34	Flex each specimen five times within one minute by applying and releasing a pressure of 15 psi. After the fifth flex, maintain the pressure at 15 ± 1 psi for five minutes.
Resistance to alcohol	No evidence of softening, tackiness, hardness, peeling, cracking, or other damage affecting serviceability.	FED 601, Method 6711	See 4.2 of this standard.
Resistance to phenol	Same as above requirement.	FED 601, Method 6711	See 4.3 of this standard.
Resistance to sterilization	Same as above requirement.	FED 601, Method 7411	See 4.4 of this standard.
Plasticizer loss	8 percent (max)	ASTM D 1203-67, <i>Standard Methods of Test for Loss of Plasticizer from Plastics (Activated Carbon Method)</i> , Method A	See 4.5 of this standard.
Resistance to mineral oil	No penetration	See 4.1 of this standard	

3.3.2. Construction—The mattress cover shall be constructed of top, bottom, and side panels. The mattress cover can either be removable or nonremovable as agreed upon between buyer and seller. If the cover is removable, it shall be designed so that it can be opened and closed using a fastener to allow for the removal of the insert. The top panel and bottom panel shall each be one continuous piece, and the side panel shall be either one continuous piece or two pieces. If the side panel is made from two pieces, the fastener shall be completely mounted in one of these pieces. The fastener shall be positioned in approximately the center of the vertical dimension of the side panel and shall open over at least one end plus one-half of the length of the mattress. The fastener shall meet the requirements for type 1, style 8, size LM, short tab pull, of FED-V-F-106d, *Fastener, Slide Interlocking*.

The cover may or may not have lifting straps as agreed upon between buyer and seller. If the cover has lifting straps, there shall be two lifting straps on one side (or both sides) approximately 36 inches apart and equidistant from the ends of the mattress. The straps shall be made of the same material as the cover; they shall be securely attached in a vertical position to the top and bottom of the finished mattress border at the seams.

3.3.3. Dimensions—The nominal length and width of the top, bottom, and side panels of the mattress cover shall be as agreed upon between buyer and seller. The tolerances on the nominal length and width of the top and bottom panels shall be plus or minus 0.5 inch on the length of the side panel and plus or minus 0.2 inch on the width of the side panel. The corners of the top

and bottom panels shall be square, or round with a radius not exceeding 3 inches. The dimensions, except for the length of the side panel, shall be measured from seam to seam by using a yardstick, metal tape, or any suitable measuring device. The part of the cover to be measured shall be laid smooth, without tension, on a horizontal surface. Length shall be measured parallel to the lengthwise direction, and width shall be measured in a line perpendicular to the lengthwise direction. The length of the side panel shall be the perimeter of the cover measured at the centerline whether the panel is constructed of a continuous piece or two pieces of fabric. In all cases other than the length of the side panel, the dimensions shall be the average of at least five different measurements uniformly distributed throughout the segment being measured.

3.3.4. Stitching

3.3.4.1. Thread—All thread shall have a minimum breaking strength of 3.0 pounds when tested in accordance with ASTM D 2256-69, *Standard Method of Test for Breaking Load (Strength) and Elongation of Yarn by Single-Strand Method*. Option 1A, which refers to straight, conditioned specimens, shall be used.

3.3.4.2. Seams and stitching—References to seams and stitching pertain to FED 751, *Stitches, Seams, and Stitching*. All stitching shall have a $\frac{3}{8}$ -inch minimum seam allowance and 10 to 12 stitches per inch. The ends of all seams not caught in other seams or stitching shall be securely backstitched from $\frac{7}{8}$ to 1 inch. Skipped stitches or thread breaks shall be repaired using the same type of stitch or same combination of stitches as the basic stitching. The fastener shall be sewn to the side panel using stitch type 301, seam type SSs-2. If the side panel contains two pieces they shall be joined together using stitch type 301, seam type SSa-1. The side panel shall be sewn to the top and bottom panels using a combination of stitch type 301 and either type 503 or 504, seam type SSa-2.

3.3.4.3. Sewing (anchoring) tape—In the case of a nonremovable cover, a sewing tape shall be adhered to the outer periphery of the latex foam insert, and the free (nonadhesive) portion of the sewing tape shall be sewn into the mattress binding tape when the top and side panels of the cover are sewn together; this will prevent the insert from slipping around inside the nonremovable cover.

TABLE 2. *Properties and test methods for the mattress inserts*

Property	Requirement	Test method	Exceptions to referenced test methods
Compression set	10 percent (max) loss of original height	ASTM D 1055-69, <i>Standard Specifications for Latex Foam Rubbers</i> , sections 17 through 19	The time of exposure shall be 22 ± 0.2 hours.
25 percent indentation load deflection (ILD value)	30 ± 6.0 pounds for thicknesses up to and including 4 inches. 40 ± 7.0 pounds for thicknesses over 4 inches.	ASTM D 1055-69, sections 20 through 23	Two specimens shall be tested, one at the center of the insert, and one between 4 and 20 inches from either end of the insert on its center line. The specimen shall be compressed at any rate between 10 and 25 inches per minutes (between 4 and 10 mm/sec)
Change in 25 percent ILD value after aging	20 percent (max)	ASTM D 1055-69, sections 15 and 16	Specimen to be aged in accordance with ASTM D 573-67, <i>Standard Method of Test for Accelerated Aging of Vulcanized Rubber by the Oven Method</i> , for 22 ± 0.2 hours at temperature of 212 ± 3.6 °F (100 ± 2 °C)
Flexing endurance	5 percent (max) loss of original height, and 30 percent (max) decrease in 25 percent ILD value	ASTM D 1055-69, sections 24 through 26	

3.4. Mattress insert

3.4.1. Material—The mattress insert shall be made from rubber latex foam having interconnecting cells and shall have the properties shown in table 2 when tested as specified therein.

3.4.2. Dimensions—The dimensions of the insert shall be from 0.1 to 3.0 percent greater than the dimensions of the cover when tested in accordance with section 14 of the ASTM D 1055-69, *Standard Specifications for Latex Foam Rubbers*.

3.4.3. Construction—The insert shall consist of not more than three sections, except that a maximum of $1\frac{1}{2}$ inches of the same material as the insert may be added to the length and to the width to adjust for size. All pieces of the insert shall be cemented together so that the joints cannot be felt through the mattress cover and so that they cannot be separated by hand except by tearing the latex foam. Core holes shall be not greater than $1\frac{1}{2}$ inches in diameter, and in addition, if a core hole is greater than $\frac{1}{4}$ inch in diameter, the distance from any point on its circumference to the edge of the insert shall be not less than the diameter of that core hole.

3.4.3.1. Surface defects—Surface defects other than core holes shall be not greater than $\frac{1}{2}$ inch in diameter or depth.

3.4.3.2. Insert reinforcements—(applicable only to removable covers) The inserts shall be reinforced along the entire circumference of their top and bottom edges with sheeting and adhesive or pressure sensitive tape. This reinforcement shall be 2 inches, plus or minus $\frac{5}{32}$ inch, in width, when measured in accordance with sections 13 through 17 of ASTM D 1910-64 (Reapproved 1970), *Standard Methods of Test for Construction Characteristics of Woven Fabrics*. It shall be applied to the insert so that a minimum of $\frac{3}{4}$ inch is adhered to the top or bottom and the side of the insert. It shall not be possible to separate the reinforcement from the insert by hand, except by tearing the latex foam.

4. INSPECTION AND TEST PROCEDURES

4.1. Resistance of the cover to mineral oil—Place an 8- by 8-inch specimen, from the cover to be tested, exterior side up, on a wood frame having inside dimensions of 6 by 6 inches, 1 inch in depth. Force the specimen into the frame using a block approximately $\frac{1}{4}$ inch smaller than the frame in length and width, and rounded at the corners, to form a basin of uniform depth. Tack

the edges of the specimen to the frame and remove the block. Pour mineral oil into the basin to a depth of approximately $\frac{1}{2}$ inch and allow it to remain there for 4 hours. The specimen should be examined for swelling or penetration to the back surface.

4.2. Exceptions to Method 6711 when testing for resistance of the cover to alcohol—The exceptions shall be as follows:

- (1) The immersion medium shall be a 70 percent solution of alcohol.
- (2) Specimens shall be taken in the warp and in the filling directions and shall be 8 by 4 inches.
- (3) The immersion time shall be 22 hours.
- (4) Twenty-four hours after the end of immersion, one specimen from both the warp and filling directions shall be folded in half, parallel to its width. The folded edge shall be rolled 10 times with a metal roller, under a load of 5 pounds.
- (5) The specimens shall be examined after immersion and after rolling.

4.3. Exceptions to Method 6711 when testing for resistance of the cover to phenol—The exceptions shall be those indicated in (2), (4), and (5) of 4.2.

4.4. Exceptions to Method 7411 when testing for resistance of the cover to sterilization—The exceptions shall be as follows:

- (1) The specimen shall be 12 inches square and shall be folded twice into a square 6 by 6 inches.
- (2) Twenty-four hours after the fifth period of sterilization, a piece 8 by 6 inches shall be cut from each direction of the specimen and tested for resistance to cracking as specified in (4) of 4.1.

4.5. Exceptions to ASTM D 1203-67 (Method A), when testing plasticizer loss of the cover—The exceptions shall be as follows:

- (1) The specimen shall be 2 by 2 inches.
- (2) The specimen shall be heated for 24 hours at a temperature of 212 ± 9 °F (100 ± 5 °C).

5. IDENTIFICATION

In order that purchasers may identify products conforming to all requirements of this Voluntary Product Standard, producers and distributors may include a statement of compliance in

conjunction with their name and address on product labels, invoices, sales literature, and the like. The following statement is suggested when sufficient space is available:

This mattress conforms to the requirements established in Voluntary Product Standard PS 63-75, developed cooperatively with the industry and published by the National Bureau of Standards under the *Procedures for the Development of Voluntary Product Standards* of the U.S. Department of Commerce. Full responsibility for the conformance of this product to the standard is assumed by (name and address of producer or distributor).

The following abbreviated statement is suggested when available space on labels is insufficient for the full statement:

Conforms to PS 63-75, (name and address of producer or distributor).

6. EFFECTIVE DATE

The effective date of this Voluntary Product Standard is the date upon which reference to the Standard may be made by producers, distributors, users and consumers, and other interested parties. Compliance by producers with all of the requirements of this Voluntary Product Standard may not actually occur until some time after its effective date. Products shall not be represented as conforming to this Voluntary Product Standard until such time as all requirements established in the Standard are met. The effective date of this Standard is February 3, 1975. After this date, products shall not be labeled as conforming to the superseded standard, CS 182-51.

7. HISTORY OF PROJECT

Commercial Standard CS 182-51, *Latex Foam Mattresses for Hospitals*, was developed at the request of the Rubber Manufacturers Association and was published in 1951.

In 1962 the Rubber Manufacturers Association requested that the National Bureau of Standards initiate a revision of CS 182-51 under the *Procedures for the Development of Voluntary Product Standards*. The proposed standard was approved by the Standing Committee and circulated for acceptance in 1965. Because of a limited response to that circulation and a conflict over flammability requirements, the project to revise the standard was terminated in 1966.

In October 1968 the Rubber Manufacturers Association requested that another attempt be made to revise CS 182-51. On three occasions

during 1972 a tentative draft of the standard was sent to the Standing Committee for approval. The proposed standard was circulated for acceptance in 1972 and 1973 but failed to gain a consensus. Finally a new proposal was approved by the Standing Committee in August 1974. The new recommended standard was circulated for acceptance in September 1974. The response to this circulation showed that a consensus among producers; distributors, and users in accordance with the published procedures was attained.

The new edition of the standard was designated Voluntary Product Standard PS 63-75, *Latex Foam Mattresses for Hospitals*, and became effective on February 3, 1975.

Technical Standards Coordinator:

George S. Chaconas,
Standards Development Services Section,
National Bureau of Standards
Washington, D.C. 20234

8. STANDING COMMITTEE

A Standing Committee has been appointed to assist in keeping this Voluntary Product Standard up to date. The names and members of the committee are available from the Standards Development Services Section, National Bureau of Standards, Washington, D.C. 20234, which serves as the secretariat of the committee.

APPENDIX A. Care of Latex Foam Mattresses

Latex foam is porous and should, therefore, be protected from contaminating liquids.

If it is necessary to remove the latex foam insert from the cover, it should be protected against prolonged exposure to direct sunlight, which will cause deterioration.

While the latex foam has sufficient tensile strength to withstand ordinary use, it can nevertheless be torn by mishandling. Therefore, some care must be taken whenever it is necessary to handle the insert, particularly when it is wet, to avoid mechanical damage.

When washing and drying the insert, the temperature of the water should be maintained at between 130 °F and 160 °F (54 °C and 71 °C) and the temperature of the dryer kept below 150 °F (65 °C).

The following materials are harmless to latex foam: ammonia water, borax, washing soda, soap solution, and synthetic detergents. Any other cleansing agents should be investigated thoroughly before using. Typical cleansing agents that are harmful include gasoline, carbon tetrachloride, bleaching solutions, and any acid material. Care must be taken so that copper and manganese-bearing materials do not come in contact with the latex foam insert.

For disinfection, the cover or insert may be sprayed, sponged, or soaked with a mild disinfectant. For sterilization, the cover or insert may be exposed to steam pressures up to 15 psi or to ethylene oxide gas under controlled conditions as recommended by the manufacturers of gas sterilization equipment.

APPENDIX B

The conversion factors and units contained in this appendix are in accordance with the International System of Units (abbreviated SI for Systeme International d'Unites). The SI was defined and given official status by the 11th Gen-

eral Conference on Weights and Measures which met in Paris in October 1960. For assistance in converting U.S. customary units to SI units, see ASTM E 380, *ASTM Standard Metric Practice Guide*, available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. The conversion factors for the units found in this Standard are as follows:

1 inch = 25.4 millimeters

1 foot = 0.3048 meter

1 pound (force) = 4.448 newtons

1 pound per square inch = 6894.76 pascals
(newtons per square meter)

$t_c = (t_F - 32)/1.8$

where t_c = temperature in degrees Celsius

where t_F = temperature in degrees Fahrenheit

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